

Remarks

Explanation of the Amendments

The foregoing amendments are believed to obviate the objection to the disclosure and the rejections of the claims under 35 U.S.C. 112. The latter are cured by cancellation of Claim 1 and by the introduction, into Claim 9, of a phrase to clarify that the copolymerizable material is copolymerizable with the epoxy resin (as discussed more fully below). New Claim 16 presents the preferred embodiments of the invention in independent form.

In response to the Examiner's inquiries, the comonomers recited are polymerizable by free radical reaction. Indeed, that property is fundamental to the invention.

More particularly, it is theorized that the free radical polymerization reaction of the vinyl or acrylic portions of the "comonomer" ingredient activates, by withdrawal of electrons, the nitrogen atom or the hydroxyl group, as the case may be, present in the molecule. The thus-activated species (believed to be a particularly effective anion precursor, in the case of the nitrogen-containing compounds) is believed to effect or catalyze opening of the oxirane ring, to thereby enable the epoxy resin to react effectively with itself or with an hydroxyl-containing comonomer to produce a random copolymer or a form of block copolymer or polymer alloy. Heat generated by the exothermic free radical polymerization reaction also promotes the secondary reactions.

Substantive Rejections

The Office Action is directed, in large part, to the assertion that Claim 1 is anticipated by each of Sirkoch et al., Thurber et al., and Usifer et al. Those rejections are obviated by cancellation of Claims 1 through 7.

Claim 9 (the only originally submitted independent claim remaining in the application), along with Claims 2-5 and 10-12, stands rejected solely on grounds of anticipation by Johnson et al. U.S. patent No. 6,348,118; pending Claims 8 and 13-15 are not rejected on substantive grounds. It is respectfully submitted that no present claim of the application is obvious over, much less anticipated by, Johnson et al.

Firstly, Johnson et al. teaches only the addition of acrylates and vinyl compounds to standard, one-part heat-curing epoxy compositions, which are cured thermally. All of the compositions contain an epoxy hardener, such as dicyandiamide, and an epoxy accelerator, such as Curezol 2MA-Azine. In contrast, the instant compositions are photoinitiated (usually by use of UV radiation), and no epoxy hardener as required (and, in preferred embodiments, such hardeners are expressly excluded).

Secondly, it must be noted that the Johnson et al. invention is predicated upon the very fact that *acrylates do not conventionally react with epoxies during free radical photopolymerization*. This is in stark and fundamental contrast to the instant invention, and clearly distinguishes the invention over the prior art.

More particularly, the Johnson et al. patent is directed to the production of pressure-sensitive adhesives, essential to which is the provision of a tacky surface. Heat-curing of a pure epoxy composition will however produce only a tack-free material, and therefore, in accordance with the Johnson et al. invention, an ingredient is

added that *will not react* with the epoxy; a long chain aliphatic acrylate may be employed for that purpose. When UV cured, the acrylates do polymerize, but they neither react with, nor effect or catalyze the reaction of, the epoxy; it is in fact the *inertness* of the aliphatic acrylate to the epoxy that is essential to the production of a pressure-sensitive adhesive, and which lies therefore at the heart of the Johnson et al. invention.

In accordance with the instant invention, on the other hand, the epoxy-acrylate or epoxy-vinyl mixtures polymerize to a tack-free state, in a one-step reaction (albeit plural, concurrent mechanisms may be involved). Normally, no hardener is present to react with the epoxy, and indeed the specification teaches that the addition of cationic curing agents can inhibit the reactions that would otherwise occur (see Example Three and Table Three).

Moreover, the Johnson et al. method is expressly a multi-step procedure (see for example column 5, at lines 41-56), essentially including a photoinitiated acrylate curing step *followed* eventually by a thermally initiated epoxy curing step. The claims of the instant application, in direct contrast, emphasize that the "epoxy resin and copolymerizable material [are] coreactive in a *single step* and [have] little or no tendency for premature reaction."¹ The claimed composition is thus unique in the art.

Finally, it is to be noted that Johnson et al. does not distinguish between compounds such as isobornyl acrylate, on the one hand, and nitrogen-vinyl or acrylamide monomers, on the other, whereas the present specification teaches specifically that the UV polymerization reaction does not occur between isobornyl acrylate and an epoxy (see

¹ Support for these limitations is found in the examples, and on page 1 at line 15 and page 16 at line 24, respectively.

Example One, Table One, composition 8). In contradistinction to the instant invention, none of the useful esters or multi-functional acrylates taught by Johnson et al. (see column 2, at lines 45-48, and column 3, at lines 20-25) contains a pendant hydroxyl group, as is present in the comonomers employed in certain embodiments of Applicant's composition. And clearly, Johnson et al. fail to teach or suggest a composition in which a catalytic anion precursor is formed *in situ*.

Thus, it is respectfully submitted that the instant claims aptly and unambiguously define an invention that is novel and patentable over the prior art. Passage of all claims of the application to allowance is believed to be clearly in order, and is earnestly solicited.

A petition for three-month extension of time, together with a check in payment of the requisite official fee, is enclosed herewith.

Respectfully submitted,
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CERTIFICATE OF MAILING

I, IRA S. DORMAN, hereby certify that this correspondence is being deposited with the United States Postal Service, postage prepaid, in an envelope addressed as set forth on the first page hereof, on August 5, 2003.